

Soyuz 25 Return Samples: Assessment of Air Quality aboard the International Space Station



Six mini-grab sample containers (m-GSCs) were returned aboard Soyuz 25. The toxicological assessment of 6 m-GSCs from the ISS is shown in Table 1. The recoveries of the 3 internal standards, ¹³C-acetone, fluorobenzene, and chlorobenzene, from the GSCs averaged 76, 108 and 88%, respectively. Formaldehyde badges were not returned aboard Soyuz 25.


Table 1. Analytical Summary of ISS Results

Module/ Sample	Date of Sample	NMVOCs ^a (mg/m ³)	Freon 218 (mg/m ³)	T Value ^b (units)	Alcohols (mg/m ³)
Lab	4/13/11	8.2	32	0.26	7.4
JEM	4/13/11	8.9	17	0.30	7.9
SM	4/13/11	9.5	34	0.28	8.3
Columbus	5/4/11	7.5	44	0.30	6.1
SM	5/4/11	7.6	53	0.29	6.2
Lab	5/4/11	8.4	28	0.35	6.7
<i>Guideline</i>		25	<i>none</i>	1.00	<5

^a Non-methane volatile organic hydrocarbons, excluding Freon 218

^b Based on 180-d SMACs and calculated excluding CO₂, formaldehyde, and siloxanes.

Except for the relatively high alcohol values, the air quality parameters are well within bounds for acceptable air quality. Ethanol was the primary cause of the high alcohol levels; however, we are not aware of a new source of this compound. These results validate the elevated ethanol measurements recorded by the Air Quality Monitor and noted in the April and May Environmental Bulletins. The alcohol guideline is intended to protect the water recovery system from risk of overloading. In the 6 air samples, carbon monoxide averaged 1.6 mg/m³, which is down slightly from previous data (enclosed tables). Overall the air quality was consistent between modules and the compound concentrations from this limited number of samples suggest that the air was acceptable for respiration.


 John T. James, Ph.D.
 Chief Toxicologist

Enclosures

Table 1: Analytical concentrations of compounds found in the Soyuz 25 return m-GSCs

Table 2: T-values of the compounds in table 1